ADDITIONS TO THE CRETACEOUS AMMONITE FAUNA OF EASTERN AUSTRALIA.

PART 1. (SIMBIRSKITIDAE, ACONECERATIDAE AND PARAHOPLITIDAE).

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(Plates XVI-XVII and Text-figures.)

INTRODUCTION.

The writer has recently published in these Memoirs (**22**) a revision of the ammonoid faunas of the "Rolling Downs Formation" and the Maryborough Beds of Eastern Australia. That work was carried out in Cambridge while holding a research scholarship. Since that time he has returned to Australia and now has access to very much more material than when the previous paper was written. It has been thought advisable, therefore, to publish a series of smaller papers, of which this is the first, supplementing the previous work by dealing with new species, new material of imperfectly known forms, new locality records, and such other matters which it may be necessary to place on record.

Family SIMBIRSKITIDÆ Spath.

The genus *Simbirskites* is, at present, a rather unwieldy grouping of species. THYSANOTOCERAS gen. nov.[1] and STOICOCERAS[2] gen. nov., specialised offshoots from the main lineage, may well be separated, restricting *Simbirskites* to the normal forms with trifurcating costæ.

Simbirskites is derived from *Speetoniceras* and gives rise to the contemporary *Thysanotoceras* via such forms as *Simbirskites umbonatus* (Lahusen), Pavlow (**13,** pl. 11, fig. 8). As in this case most triplicate "perisphinctids" are derived from an originally biplicate type. An interesting exception, however, is ARRHAPHOCERAS gen. nov.,[3] from the *dispar* zone of the Upper Albian,

[1] *Thysanotoceras*, gen. nov. (θύσανωτὸς, fringed). Genotype: *Ammonites* (*Olcostephanus*) *picteti*, Weerth (**21,** p. 12, pl. 2, fig. 5). This includes the group with prominent bundling of costæ in groups of four at the tubercle.

[2] *Stoicoceras*, gen. nov. (στωϊκὸς, of a colonnade). Genotype: *Ammonites* (*Hoplites*) *teutoburgiensis*, Weerth (**21,** p. 20, pl. 5, fig. 1).

[3] *Arrhaphoceras* gen. nov. (ἄρραφος, without a seam). Genotype: *Ammonites woodwardii*, Seeley (**16,** p. 12, pl. 11, fig. 3). The genus includes the forms derived from *Pleurohoplites* by the costæ continuing across the venter.

which is derived from the normal hoplitid *Pleurohoplites* and may lead to the Cenomanian *Calycoceras*.

Simbirskites, *Speetoniceras* and *Thysanotoceras* all contain unusually evolute forms in addition to the species of normal volution (e.g. *Simbirskites kayseri*, Neum. & Uhlig sp.; *Speetoniceras losseni*, Neum. & Uhlig sp.; *Thysanotoceras neumayri*, Weerth sp.).

A common feature among the Simbirskitidæ is the decline in virgation of ribbing with age. This, perhaps, reaches its maximum in *Thysanotoceras nodocinctum* Weerth) which, from the stage with normal quadrifurcating ribs, suddenly decreases at a diameter of about 30 mm. to unbranched ribs, the holotype showing, as intermediate stages, only one trifurcating and two bifurcating ribs. A somewhat analogous case is the rapid decrease in the number of ribs per whorl in some other and earlier "perisphinctids" such as *Paravirgatites*.

The importance of rapid changes in the type of venter in ammonite lineages is, in spite of much recent work, still too little appreciated. As Spath has pointed out, the keeled *Schlœnbachia* is without doubt derived from *Pleurohoplites*. *Arrhaphoceras* represents another sudden change in the same stock. This change is very interesting; for it is an example of ribbing continuing across the venter of a stock which normally has an interrupted venter. That such changes may be frequent is suggested by the not infrequent occurrence of such "sports" as the "*Hoplites tuberculatus*" figured by Crick (**1**, p. 1). Indeed such "species" as *Ammonites acanthonotus* and *Ammonites glossonotus*, Seeley, (**16**, p. 10, pl. 10, figs. 4, 5), are nothing else than deformed specimens of hoplitids (*Pleurohoplites*). Similar "sports" are present in keeled stocks; and freak specimens of *Spathiceras*[4] with closed or nodate venters are not uncommon. It is this tendency to close the venter that has produced *Stoliczkaia* from the normal Lyelliceratidæ.

The production of forms with interrupted venters from stocks with plainly arched venters is also very common, the origin of *Dufrenoyia* from *Parahoplitoides* being a case in point. In Simbirskitidæ this is well shown on the holotype of *Stoicoceras teutoburgiensis* (Weerth) where later whorls develop an interrupted venter. It is also suggested, e.g., in Perisphinctidæ (s. str.) and in Otoitidæ (the Western Australian *Otoites depressus*, Whitehouse, has a suggestion of rib-break on the venter).

Such known rapid changes cast doubt upon the genetic relationships of, e.g., the forms placed in *Berriasellidæ*, and might suggest a possible, though, perhaps, not very probable, relation between Simbirskitidæ and Neocomitidæ.

[4] The genus *Spathiceras* is proposed elsewhere by the writer (in a paper to appear in the Report of the Aust. Assoc. for the Advan. of Sci., Vol. XVIII), with *Hystrichoceras antipodeum*, Etheridge fil. (**3**, p. 47, pl. 7, figs. 6, 7) as genotype.

Genus SIMBIRSKITES Pavlow (emend.).

(Plate XVI, figure 1; Text-figure 5.)

SIMBIRSKITES MORVENÆ sp. nov.

1909 *Perisphinctes kayseri*, Etheridge Jr. non Neumayr and Uhlig (**4**, p. 239, pl. 68).
1926 *Simbirskites spp.*, Whitehouse (**22**), p. 200.

Description.—Coiling serpental; sublatumbilicate. Venter arched. Prorsiradiate; about 25 primary costæ to the last whorl on holotype; bullate at the umbilicate shoulder and trifurcating. Whorl-section slightly compressed.

Dimensions.—Holotype: 64, 39, 31, 39.

Remarks.—This species belongs to the group of *S. speetonensis*, Pavlow (**12**, pl. 4, fig. 1), non Young and Bird, and *S. fasciato-falcatus* (Lahusen), for which possibly a new generic name is required. The group includes the forms with the costæ crowded and prorsiradiate, and the umbilical tubercle bullate. In these features, as in the slightly compressed whorl-section, the group resembles *Craspedodiscus*, but has not the prominently discoidal form. The group apparently represents another orthogenetic trend, from normal *Simbirskites* of the *decheni* group, parallel to that leading to *Craspedodiscus*.

The larger specimen figured by Etheridge (**4**, p. 239, pl. 68) may belong to the same species; but this cannot be determined until the earlier whorls of such large forms are known. For the present that larger specimen may be regarded as belonging also to *S. morvenæ*.

The specimens (which were figured by Etheridge) consist of a large form with the holotype and three specimens of *Leptomaria* (?) *sp.* nestling in its umbilicus. These specimens are not naturally arranged, but the smaller ones have been fixed to the larger with cement. All, however, have the same matrix, in which are embedded fragments of *Ostrea* and *Trigonia*. These specimens, according to the information of Mr. H. Tryon, were presented to the Queensland Museum by Mr. Hurst over 30 years ago. In the Museum catalogue they are listed as coming from Victoria Downs, Morven.

Lower beds, below the Roma Series proper, occur in other places in Queensland—North of Roma, at Natal Downs, and in the Cape York Peninsula—but I know of no matrix elsewhere in the area similar to that of *S. morvenæ*.

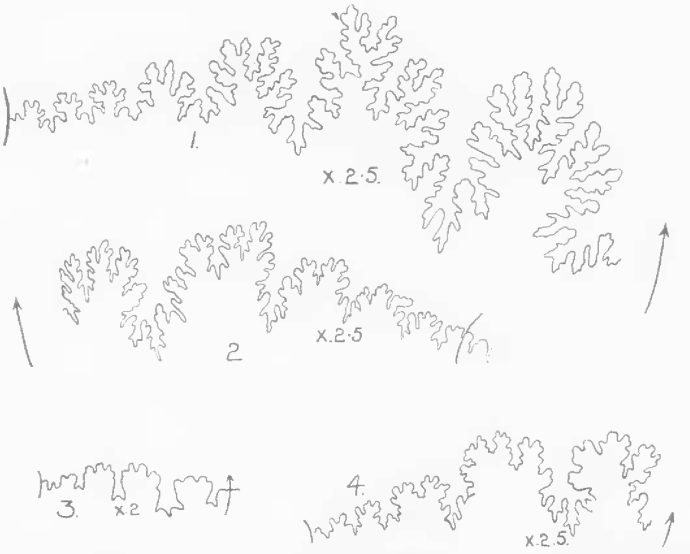
Family ACONECERATIDÆ Spath.

To the three genera recently included by the writer in this family is now added a fourth—*Gyaloceras*. *Theganeceras* is the only such genus not yet found in the Australian Aptian.

The distribution in Australia of the members of the family is interesting. *Aconeceras* and *Sanmartinoceras* are best represented in collections made from the Walsh River (North Queensland) from which area came also the only specimen of *Gyaloceras*. *Aconeceras* is, as yet, known from no other Australian

locality; but *Sanmartinoceras* is known also from Primrose Springs (South Australia), Palmer River (North Queensland), and "South Central Queensland." The beds of Primrose Springs are apparently very high in the Roma Series—higher, I believe, than any of the beds from which fossils have been collected in the Roma district.[5] The apparent absence of the genus in the latter and well-known district is thus not surprising.

The specimen from "South Central Queensland" is part of the Blomfield collection in the Australian Museum. The generalised locality given for this collection, as stated by Etheridge (**4**), is "the Sources of the Barcoo, Ward, and Nive Rivers." In this area the topmost portion of the Roma Series[6] is known at a locality eight miles east of Tambo, from which recently I identified a specimen of *Ammonitoceras* (**23**). Possibly the *Sanmartinoceras* came from or near this same locality.



TEXT FIGURES 1–4. SEPTAL SUTURES OF ACONECERATIDÆ.

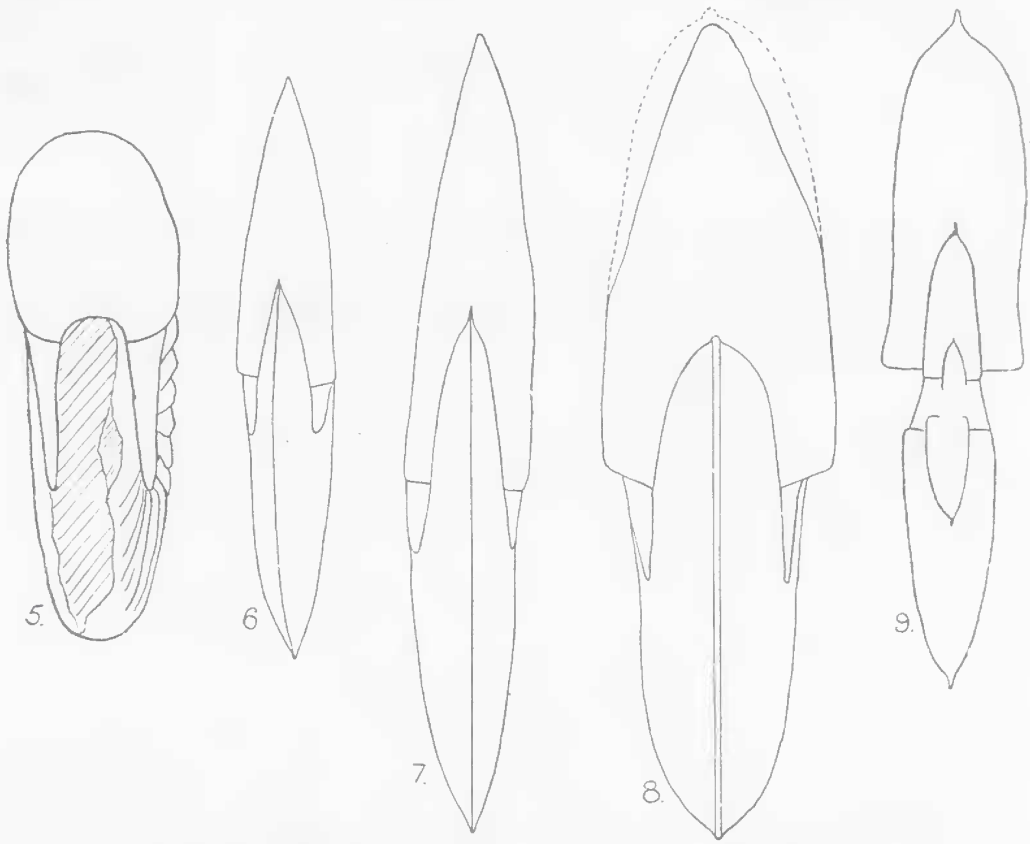
1. *Aconeceras walshense* (Eth. fil.), topotype (pl. xvi., fig.-3); 2. *Sanmartinoceras olene* (Tenison-Woods), neotype (pl. xvii., fig. 6); 3. *Sanmartinoceras fontinale* (Hudleston), holotype (pl. xvii., fig. 2); 4. *Sanmartinoceras fontinale* (Hudleston), specimen figured previously (22, pl. 41, fig. 3).

Evidence points to the fact the highest portion of the Roma Series is not well exposed in the vast area of the Artesian Basin where overlaps of the Tambo Series or the Winton Series often conceal it. This would explain the few localities from which *Sanmartinoceras* is known.

[5] I have recently examined the large fossil collections made by Mr. L. C. Ball in the Roma district. The highest fossiliferous horizon was represented by the beds of Roma Downs which appeared to be at the top of the Tropæuman stage. It is probable that the higher beds in this area are covered by an overlap of the Post-Albian Winton (fresh-water) Series; for no fossils of the Tambo Series are recorded between Roma and Surat. The beds at Roma Downs appear to be on the same horizon as those of Peake Downs (S. Aust.). Primrose Springs lying eastwards of the latter locality is, without doubt, on a slightly higher horizon.

[6] Higher, of course, than the beds of Roma Downs with *Tropæum*.

It is fairly certain that *Aconeceras walshense* is a Tropæuman species. The Tropæuman stage being well known in many parts of the Artesian Basin it is at first sight puzzling to find that this species is known only from the one locality. This may be due to faulty collecting, particularly since most of the known specimens were collected on the one occasion (by the Hahn expedition). The species may, therefore, be expected at Roma, near Peake Downs and other places on that horizon. It is possible that the species has a very limited time-range and that the bed containing it may be missing from most of the known fossiliferous areas of the Tropæuman stage.



TEXT-FIGURES 5-9. SECTIONAL VIEWS OF AMMONITES.

5. *Simbirskites morvenæ*, sp. nov., holotype (pl. xvi., fig. 1); 6. *Aconeceras walshense* (Eth. fil.), holotype (pl. xvi., fig. 2); 7. *Aconeceras walshense* (Eth. fil.), topotype (pl. xvi., fig. 3); 8. *Gyaloceras smithi*, sp. nov., holotype (pl. xvii., fig. 1); 9. *Sanmartinoceras fontinale*, Hudleston sp. (pl. xvii., fig. 5). All figures natural size.

Further collecting will, almost certainly, give new locality records for the members of this family; and, further, we may expect such collecting to bring to light new species from beds of the Roma Series from which, at present, no aconeceratid forms are known.

The outstanding feature of these Australian forms is their enormous size. Each species is represented by individuals far larger than any known member of the family in the other continents.

Genus ACONECERAS Hyatt.

ACONECERAS WALSHENSE (Tenison-Woods).

(Plates XVI, figures 2 and 3; Text-figures 1, 6, and 7.)

Four specimens of this species, all contained in the Queensland Museum collection, are known. The dimensions of these specimens given according to the usual conventions, are—

Holotype		75.	54.	18.	14.
F. 1594	(Q.M. Coll.)	80 (68).	54.	18.	13.
		(49).	56.	19.	14.
F. 1871	(Q.M. Coll.)	92 (72).	57.	—.	12.
F. 1704	(Q.M.Coll.)	105 (105).	56.	15 (+).	8
		(72).	57.	18.	11.

The faint concentric striæ, which are intensified in the five pronounced striæ which lie on the axis of the outer flexure of the radial line, are seen only on the holotype, the original shell of the other specimens not being well preserved. The intensifying of the radial line at the point of the inner flexure of the radial line is also interesting, giving a slight "costate" appearance to this narrow zone in the median region of the sides.

Specimen *F. 1704* (figured on pl. XVI, fig. 3) might be separated as a separate variety more involute than the type section. But specimen *F. 1871* is intermediate between the two and for the present all four specimens are recorded under the one name.

Locality.—Walsh River (Q.M. Coll.).

Genus GYALOCERAS nov.[7]

Genotype: *Gyaloceras smithi*, sp. nov.

Remarks.—The new species described below differs so markedly from the normal forms of *Aconeceras* that it is deemed advisable to separate it as the type of a new genus, *Gyaloceras*, distinguished from *Aconeceras* by its greater inflation and by the more obtuse angle of the venter. In degree of involution, smoothness of shell, type of radial line and septal sutures it agrees closely with *Aconeceras* from which it is apparently derived.

The precise hemeral limits of the genus within the Aptian remain to be determined; but it probably belongs to the Tropæuman stage (Lower Gargasian).

[7] γύαλον, a breastplate.

GYALOCERAS SMITHI sp. nov.

(Plate XVII, figure 1 ; Text-figure 8.)

Description.—Coiling oligogyral, angustumbilicate ; fastigate, subcarinate ; sides convergent ; anguliradiate ; test smooth, but with the radial striæ intensified in a narrow zone at the middle of the sides ; septal suture as in *Aconeceras*.

Dimensions.—

109	(109).	56.	25 (+).	12.
	(72).	56.	28.	14.

Remarks.—There is no other member of the genus with which to compare the species. It has the same intensification of the radial striæ at the median zone of the sides as in *Aconeceras walshense* but there are no concentric striæ. The keel is more pronounced than in *Aconeceras*.

On the side illustrated the shell has suffered a slight injury during life. This, as is usual with the ammonites, is expressed by the reflection of the growth lines for a time. The tiny angular kink in the growth line in the figure is due to this. The radial line, it will be noted, is not so sharply anguliradiate as in *Aconeceras*.

The species is named in honour of the donor, Mr. E. W. Smith

Locality.—Walsh River (Q.M. Coll.).

Genus SANMARTINOCERAS Bonarelli.

Eight specimens of *Sanmartinoceras* have been collected from the Roma Series. Of these the holotype of *S. olene* (Tenison-Woods) can no longer be found. A study of the remaining eight specimens has caused a slight revision of the grouping into species.

These specific relations are not a little puzzling. The specimens fall naturally into two specific groups. One group (the group of *S. olene*) includes the holotype of *S. olene* (i.e. to judge solely from the type figure, since the specimen is lost) and the specimen figured by Etheridge in 1901 (2, pl. 2, fig. 4) which is now refigured (pl. XVII, fig. 5). The remaining specimens belong to the group of *S. fontinale*. The two groups differ in that—

(i.) The median flexure of the falcate radial line is more pronounced in *S. fontinale* ; and

(ii.) The costæ of the group of *S. olene* are, in the early stage, numerous, regular, and faintly impressed, whereas in *S. fontinale* the costate stage begins more abruptly.

If one judges from Tenison-Woods' figure of the holotype the two specimens in the group of *S. olene* do not agree in all specific features. The costæ of the holotype are less flexed than those of the other specimen, while

the slope towards the venter is greater. I am inclined to think, however, that the original figure was a little incorrectly drawn. Certainly the apertural view, as shown in that figure, suggests that it is a little inaccurate. Since the specimens agree in the main features that distinguish the group from the group of *S. fontinale* I have regarded them as representing but a single species ; and, since the holotype is definitely lost, the other specimen, now refigured, is selected as neotype.

The group of *S. fontinale* is regarded as containing only the one species which undergoes a mutational change in which it is not possible, at least at present, to separate varietal stages.

SANMARTINOCERAS FONTINALE (Hudleston).

(Plate XVII, figures 2-5 ; Text-figure 2.)

1890 *Ammonites fontinalis,* Hudleston (**5**), p. 241, pl. 9, fig. 1.
1902 *Amaltheus sp.,* Etheridge Jr. (**3**), p. 45, pl. 7, fig. 8.
1924 *Sanmartinoceras fontinale,* Spath. (**19**), p. 74.
1926 *Sanmartinoceras olene,* Whitehouse (pars) non Tenison-Woods, (**22**), pl. 41, fig. 3.

All the known specimens of *S. fontinale* have now been figured. These six specimens show a wide variation in the development of costæ. On the holotype and the other South Australian specimen (figured by Etheridge) costation begins very early. On the three Walsh River specimens costæ are not developed until a later stage ; on one of these (pl. XVII, fig. 2) the costæ begin, however, moderately early, but on the largest specimen (pl. XVII, fig. 5) they do not appear until very late. All, however, have the same type of radial line and the same concentration of costæ and, consequently, they are here regarded as belonging to the same species lineage. Such a lineage, beginning in the smooth *Aconeceras* stage, would naturally proceed though early forms, with the costæ present only on the body-chamber, to more or less completely costate forms like the holotype. Such forms as that of plate XVII, figure 4 would be earlier than the holotype ; and the degree of costation may, in the future, serve as a valuable index of the horizon.

If, as is most likely, the change in costation in the lineage proceeds uniformly any varietal division of the group would be very artificial. However subdivision of the group may be possible when many more specimens are available. At present the specific name must be applied to forms widely different in the stage at which the costæ appear, but agreeing in all other features.

The main diagnostic features of *S. fontinale,* as here redefined, are—

(i.) The very falcate radial line. The median flexure is acute and very marked and the dorsal portion is strongly arcuate.

(ii.) The costæ begin very abruptly as in the normal species of *Sanmartinoceras* from other countries. A short striate stage leads from the smooth to the costate stages on the shell.

(iii.) The dimensions of the species are as follows :—

Holotype	25.	50.	26.	19.
Q.M. Coll. (*F. 1869*)	43.	55.	—.	13.
A.M. Coll. (*F. 7304*)	45.	53.	20.	13.
Q.M. Coll. (*F. 1722*)	37.	56.	23.	13.
	56.	56.	20 (+).	11
Q.M. Coll. (*F. 1870*)	78.	52.	21.	14.

The septal suture is of the normal type.

Localities.—Primrose Springs. (B.M. Coll., holotype), Lake Eyre Basin (Univ. of Adelaide Coll.), Walsh River Q.M. Coll.), South Central Queensland (A.M. Coll.).

SANMARTINOCERAS OLENE (Tenison-Woods).

(Plate XVII, figure 6; Text-figures 3, 4, and 9.)

1883 *Ammonites olene* Tenison-Woods (**20**), p. 150, pl. 7, fig. 8; pl. 8, fig. 1.
1892 *Ammonites* (*Amaltheus*) *olene* Etheridge Jr. (**6**), p. 492, pl. 30, fig. 4.
1901 *Amaltheus olene* Etheridge Jr. (**2**), p. 32, pl. 2, fig. 4.
1926 *Sanmartinoceras olene* (pars), Whitehouse (**22**), p. 205 (non pl. 41, fig. 3).

As redefined above *S. olene* is characterised by—

(i.) The median flexure of the radial line is more obtuse and not so prominent as in *S. fontinale*, while the dorsal portion is not so curved.

(ii.) The costæ do not begin abruptly but increase gradually in intensity.

In regard to this latter feature it should be noted that Tenison-Woods' figure of the holotype shows definite costæ on all parts of the shell visible. On the neotype the costæ on the initial half of the last whorl are so faint that they are extremely difficult to reproduce in a photograph. (The photographer has, however, succeeded in showing them slightly in the photograph here reproduced.) In the drawing of the neotype originally given by Etheridge they were slightly over-emphasised and were not represented as crowded as they appear on the specimen. Another mistake in that figure was that the costæ were shown in part rectiradiate whereas they are, of course, always falcate. On the last whorl of the neotype there are about 33 costæ the first 16 of which are "subcostæ."

In the presence of this "subcostate" stage leading from the smooth to the normally costate portion this species is decidedly different from the other known forms of *Sanmartinoceras*, though probably most closely allied to *S. fontinale*.

The septal suture is of the normal *Sanmartinoceras* type.

The dimensions of the neotype are—73 (54). 50.—.16.

Localities.—Palmer River (M.M. Coll., holotype (this specimen is now lost, and appears to have disappeared from the museum), Walsh River (G.S.Q. Coll., neotype).

Family PARAHOPLITIDÆ Spath.

Previously (**22,** p. 206), in some hesitation, the writer had referred to the genus *Parahoplitoides* a fragment which he had not seen but which had been figured by Etheridge (**3,** pl. 7, fig. 1). An examination since then has shown that the specimen is, apparently, one of the Desmoceratidæ and, therefore, will be treated in a later paper in this series.

Parahoplitoides is, however, present in the Roma Series.

The relations of the early *Parahoplitoides* to the later *Parahoplites* is not clear. The more inflated species of *Parahoplitoides*, such as that now described, may suggest that the change was accomplished by a lineage specialising in inflated forms. It seems to the writer, however, that *Parahoplites* possibly may be derived from Cheloniceratidæ; in which case a new family name would be required for *Parahoplitoides* and its offshoots *Stenhoplites*, *Dufrenoyia*, and CLOIOCERAS (gen. nov.).[8]

Genus PARAHOPLITOIDES Spath.

PARAHOPLITOIDES PLENUS sp. nov.

(Plate XVI, figure. 4.)

This species is founded upon a fragment distorted in the region of the venter. The dimensions, therefore, cannot be given.

The ribbing is of the type normal for the genus. The costæ, which are flexiradiate, originate and bifurcate at the umbilical margin. They are about as prominent as those of *P. bodei* (v. Kœnen) and *P. fissicostatus* (Phillips) (**14,** pl. 2, fig. 49), and less so than those of *P. deshayesi* (Leymerie) (**9,** pl. 17, fig. 17). Unlike *P. bodei*, which it resembles in many respects, the ribs are all continuous from the umbilical margin.

The septal suture, a portion of which is visible, resembles that of *P. læviusculus* (v. Kœnen) (**8,** p. 224, pl. 8, fig. 4).

The species is rather more inflated than the European and African members of the genus.

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[8] *Cloioceras*, gen. nov. (κλοίος, a collar). Genotype: *Hoplites ruspolii*, Mayer-Eymar (**10,** p. 258, pl. 2, figs. 10, 11). This genus is an unusual offshoot of *Parahoplitoides* with two ventro-lateral rows of tubercles on each side and simple ribbing.

P. plenus has little in common with *P. weissi* (Neum. & Uhlig) (**11**, pl. 46, fig. 1) and the similar forms from the *weissi* zone figured by Kilian (**7**). Its relations are entirely with the lower forms of the *bodei* zone of the Bedoulian, i.e. the lowest portion of the Australiceratan Stage.

At first sight this specimen might be mistaken for one of the species of *Sanmartinoceras*; but it is easily distinguished by the absence of a keel and by the non-falcate costæ.

Locality.—The specimen is in two parts which fit together perfectly. One portion was registered in 1904 as having been found at Mt. Brown (N.S.W.) and presented by Mr. Klein. The other portion was registered in the Museum books in 1907 with the locality "Queensland." Mr. Klein was a noted collector in and around the opal fields of New South Wales, and there can be little doubt that the former locality, Mt. Brown, is correct. The holotype is in the Mining and Geological Museum, Sydney.

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EXPLANATION OF PLATES XVI–XVII.

(All figures are natural size.)

Plate XVI.

Fig. 1.—*Simbirskites morvenæ* sp. nov.

Holotype (Q. M. Coll.). Locality: Victoria Downs, Morven (Qld.).

Figs. 2, 3.—*Aconeceras walshense* (Eth. fil.).

Fig. 2 (*a*), (*b*). Holotype, lateral and apertural views. Locality: Walsh River (Q. M. Coll.).

Fig. 3.—Specimen F. 1704 (Q. M. Coll.), a form rather more involute than the holotype. Locality: Walsh River (North Qld.).

Figs. 4 (*a*), (*b*).—*Parahoplitoides plenus* sp. nov.

Lateral and sectional views of holotype (M. G. M. Coll.). The outline of the venter (which, on the specimen, is crushed) is restored. Locality: Mt. Brown (N.S.W.).

Plate XVII.

Fig. 1.—*Gyaloceras smithi* sp. nov.

Holotype (Q. M. Coll.). Locality: Walsh River (North Qld.). The slight flexure at X is due to an injury.

Figs. 2–5.—*Sanmartinoceras fontinale* (Hudleston).

Fig. 2 (*a*), (*b*). Copy of protograph of holotype from Primrose Springs, South Australia (B. M. Coll.). Costate stage begins at a diameter of 18 mm.

Figs. 3 (*a*), (*b*). Specimen from South-Central Queensland (A. M. Coll.). Costate stage is already fully developed at a diameter of 29 mm.

Fig. 4.—Specimen from Walsh River (Q.M. Coll.). Costate stage begins at a diameter of 30 mm.

Fig. 5.—From Walsh River (Q. M. Coll.). The largest known specimen. Costate stage is developed, but only very weakly, at a diameter of 53 mm.

Fig. 6.—*Sanmartinoceras olene* (Tenison-Woods).

Neotype, from Walsh River (G. S. Q. Coll.).